



Local effort to protect majestic golden eagle takes wing

Both the Laboratory's Livermore site and Site 300 reside within one of the largest known populations of golden eagles in the world. Eagles have been observed hunting ground squirrels in the buffer zones of the Lab's main site and nesting on remote hilltops at Site 300. This federally protected bird-of-prey has special meaning to native peoples as well as other area residents today, particularly because of the wild lands it calls home.

They are found from Northern Alaska and Canada southward through the intermountain regions (Rockies, California's Coastal Ranges, etc.) to central Mexico and western Texas. The numbers of breeding pairs within the U.S. has been estimated to be only about 17,500 pairs.

The golden eagle is not directly related to the bald eagle, our national symbol, but would be more aptly described as a distant cousin. In an ecological role, bald eagles tend to be associated with water and fish populations whereas the golden eagle is found in interior, upland areas that are drier and offer small mammals, such as ground squirrels, as a food source.

Recent efforts to understand the local eagle population reveal several significant threats to the birds. The Laboratory is working to protect the local population of golden eagles.

Protecting the local eagle population

In the mid-nineties, Site 300 participated in a golden eagle population study that included the Altamont Pass and Wind Resource Area. The University of California, Santa Cruz (Predatory Bird Research Group) led the study in assessing the demographic attributes of eagles that lived and foraged within the Diablo Mountains. The initial study was funded by the wind industry and the Department of Energy's National



Soaring immature bald eagle (shows similar coloration with golden eagle).



A nest platform for a pair of nesting eagles.

All about the golden eagle

The golden eagle (*Aquila chrysaetos*) is among the largest birds-of-prey in the United States with wingspans reaching 2.3 meters (7.5 feet) and weighing up to 7 kg (15.4 lbs).

Size: Female golden eagles are typically larger than males by roughly 25 percent. This difference is likely due to the role each gender plays during the breeding season. Female eagles incubate and guard the nest while the male provides food. The larger size of the female improves her ability to brood eggs and defend the nest site, while the male's smaller size allows him improved acceleration and the ability to carry larger prey relative to his weight.

Coloration: Golden eagles do not display adult plumage until their fifth year. The adult plumage is primarily dark brown and distinct from the juvenile which has conspicuous white feathers on the underside of the tail or in the wings at the carpal joints. The recognized "golden" coloration on the neck and head of adult birds are aged feathers that have become bronzed (bleached) from the sun over time.

Habitat: Golden eagles prefer open, topographically-rich terrain typical of the Diablo and Coast Ranges. Throughout the western U.S., golden eagles can be found inhabiting foothills and mountains in arid and Mediterranean climates. Much of the remaining eagle habitat in Central and Southern California occurs on private ranches and properties that are remote islands of open shrublands or oak savannahs.

Food sources: Prey eaten by golden eagles in the interior coastal range consists mostly of ground squirrels and jackrabbits. Golden eagles



will consume carrion in the winter when food is scarce and are capable of exploiting waterfowl concentrations (i.e., migratory ducks and geese) as well. Prey diet can also include snakes as their frequency or availability allows.

Breeding behavior: A particular flight pattern referred to as "undulating flight" is commonly exhibited by eagles in this area. This display consists of a series of steep dives and resulting upward stall-outs with wing-flapping at each apex. Undulating flight is considered to be a courtship presentation, but also may be used to demonstrate territoriality.

The relatively long length of time (generally 5 years) required before an eagle can breed coupled with "similarity of appearance" between both juvenile bald and golden eagles led to the congressional approval of the Eagle Protection Act of 1940. This Act protects bald and golden eagles, their nests, eggs, feathers and occupied habitat, from disturbance and "take" without the appropriate federal and state permits. This law has assisted in the recovery of both golden and bald eagles in regions where they both occur.

Renewable Energy Laboratory and relied on the use of small radio telemetry devices that tracked individual birds from birth to death.

Tens of golden eagles that were resident at Site 300 were captured/outfitted with radio-transmitters and released during this time period. A total of 179 eagles were caught in the Wind Resource Area (including those at Site 300) and each were tracked for over four years. Results indicate that on average 40-60 sub-adult and adult eagles are killed by wind turbines in this area each year.

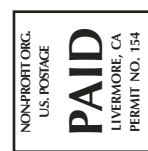
Eagle wingspans are large enough to span the live conductors on most utility poles and up to 70 percent of the bird electrocution fatalities in the western U.S. are estimated to involve eagles. During 1994-1997, Site 300 installed protective covers on power pole conductors that are preferred perches for birds-of-prey species on the property. These protectors were instrumental in saving numerous hawks and eagles from electrocution. Additionally, in 1997 a nest platform was established for a pair of eagles that were attempting to nest on an adjacent power pole. A potential fatality was avoided.



Measurement of golden eagle wing by researcher.



Golden eagle lifting from its perch (high voltage powerpole) showing phase protection to avoid electrocution (black object on center phase) at Site 300.



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